PATENT ABSTRACTS OF JAPAN

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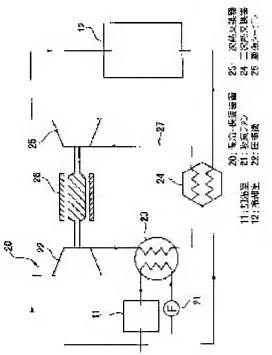
(54) COLD AND HEAT INSULATION APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To expand a storage space, and to save the power.
SOLUTION: A cold and heat insulation apparatus comprises one system, and has an intake fan 21, a compressor 22, a primary heat exchanger 23 and a secondary heat exchanger 24, and an expansion turbine 25. Outside air is taken into the primary heat exchanger 23 by the intake fan 21, the outside air is heat-exchanged with high-temperature and high-pressure air from the compressor 22 in the primary heat exchanger 23, and generated in hot air, and the hot air is fed to a heating chamber 11. Air from the compressor 22 is passed through the heat exchangers 23 and 24 and cooled, and further passed through the expansion turbine 25 to generate cold air of low-temperature at the atmospheric pressure, and the generated cold air is fed to a cooling chamber 12.



DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the heat insulation and the heat retaining device which performs both heating and cooling.
[0002]
[Description of the Prior Art]For example, if it is in vending machines, such as can juice, both cold drinking water and warm drinking water are prepared. as such a vending machine -- drawing 5 -- like -- warming -- it is classified into the room 1 and the cooling room 2, and is shown in drawing 6 in the machinery room 3 established in the lower part of them 1 and 2 -- as -- warming -- it has the heating apparatus 4 for heating the room 1, and the cooling system 5 for cooling the cooling room 2.
[0003]energizing the heating apparatus 4 to a heater -- warming -- it is heating the room 1 and the goods 9 are warmed. The cooling system 5 uses as a refrigerant the chlorofluocarbon etc. which were enclosed with the inside, carries out adiabatic expansion by being decompressed by the decompressing means which is not illustrated, after this radiates for it heat and liquefies the heat of condensation by adiabatic compression being carried out, becoming high voltage, and subsequently to the condenser 7 reaching with the compressor 6, and serves as low temperature low pressure. And the refrigerant of low temperature low pressure results in the evaporator 8 further, cooling wind blows are generated by taking evaporation heat, and goods are cooled by this being sent into the cooling room 2. On the other hand, the refrigerant cooled by the evaporator 8 returns to the compressor 6, and the same cycle is repeated hereafter.
[0004]
[Problem(s) to be Solved by the Invention]by the way -- since it has two lines of the cooling system 5 and the heating apparatus 4 in the vending machine shown above -- warming -- the space of the room 1 and the cooling room 2 received restrictions, and there was a problem to

which storage space becomes small. Especially the cooling system 5 needed a decompressing means, the piping 5a besides the compressor 6, the condenser 7, and the evaporator 8, etc., and there were many constituting points, and it was difficult to make the installing space of the machinery room 3 small. When the cooling system 5 and the heating apparatus 4 were formed independently, respectively, electric power was consumed so much and there was a problem on which a running cost soars. And since the cooling system used chlorofluocarbon as a refrigerant, it was not preferred from environment.

[0005]It is in providing the heat insulation and the heat retaining device which this invention was made in consideration of such a situation, and that purpose can obtain the function of the both sides of cooling and heating, and can attain expansion-izing of storage space, and power-saving.

[0006]

[Means for Solving the Problem]To achieve the above objects, this invention has proposed the following means. an invention concerning claim 1 -- this invention -- a cooling room and warming -- heat insulation and a heat retaining device which generates cold supplied to a room, respectively and pre-heating by one line are characterized by comprising:

carrying out heat exchange of the open air to air of high temperature high pressure -- warming -- a warm air generating means which generates pre-heating sent into a room.

A cold creating means which generates cold which is made to carry out adiabatic expansion of the air of low-temperature high voltage further, and is sent into a cooling room.

[0007]according to heat insulation and a heat retaining device concerning this invention -- pre-heating -- warming, since a warm air generating means supplied to a room and a cold creating means which supplies cold to a cooling room are constituted from one line, warming -- it is lost that a space of a room and a cooling room is restricted, expansion-ization of storage space can be attained, since it is moreover one line, power consumption can be reduced, and cheap-ization of a running cost can be attained.

[0008]In heat insulation and the heat retaining device according to claim 1, an invention concerning claim 2 said warm air generating means, Heat exchange of the air of a compressor which generates air of high temperature high pressure, an inhalation-of-air object which incorporates the open air, and high temperature high pressure from a compressor is carried out to the open air incorporated with said inhalation-of-air object, and it has a heat exchanger supplied to a cold creating means, and said cold creating means consists of expansion turbines.

[0009]According to heat insulation and the heat retaining device concerning this invention, are generable to pre-heating by heat exchange of the open air being carried out by air and a heat exchanger of high temperature high pressure from a compressor, Since cold is generable by

air of high temperature high pressure being led to an expansion turbine through a heat exchanger, both sides of pre-heating and cold are exactly generable.

[0010]In heat insulation and the heat retaining device according to claim 2, as for an invention concerning claim 3, said compressor and said expansion turbine are sharing the axis of rotation. According to heat insulation and the heat retaining device concerning this invention, power-saving is also further realizable by supplying not only expansion-izing of storage space but recovery energy from an expansion turbine as a part of driving source of a compressor by sharing the axis of rotation.

[0011]

[Embodiment of the Invention]Hereafter, this embodiment of the invention is described with reference to drawings. It is a figure showing the vending machine which applied the heat insulation and the heat retaining device which drawing 3 requires for the 1 embodiment of this invention from drawing 1, and is a piping diagram showing the heat insulation and the heat retaining device with which drawing 1 and drawing 2 were installed in the front view and side sectional view of a vending machine, and drawing 3 was installed in the vending machine. the vending machine 10 of this embodiment -- drawing 1 -- like -- warming -- the room 11 and the cooling room 12 are formed, and the machinery room 13 is established in the lower part of them 11 and 12 -- the machinery room 13 -- drawing 2 -- like -- warming -- while keeping the room 11 warm, the heat insulation and the heat retaining device 20 for cooling the cooling room 12 are formed.

[0012]One heat insulation and the heat retaining device 20 become clitteringly like drawing 3, and is provided with the suction fan (inhalation-of-air object) 21, the compressor 22, the primary heat exchanger 23 as a heat exchange means and the secondary exchanger 24, and the expansion turbine 25. and the pre-heating which was heated by heat exchange of the open air being carried out to the air of the high temperature high pressure generated by the compressor 22 in the primary heat exchanger 23 if the open air is incorporated into the primary heat exchanger 23 with the suction fan 21, was generated by pre-heating, and was generated -- warming -- the room 11 is supplied.

[0013]On the other hand, heat exchange is carried out to the open air because the air of the high temperature high pressure from the compressor 22 passes the primary heat exchanger 23, After condensing and being cooled as high-pressure air, it is further cooled by passing the secondary heat exchanger 24, adiabatic expansion is carried out because the cooling air passes the expansion turbine 25, and it is further generated by the cold of low-temperature atmospheric pressure, and the generated cold is supplied to the cooling room 12.

[0014]The expansion turbine 25 will be cooled by lowering the air at a stretch to atmospheric pressure, and carrying out adiabatic expansion, if high pressure air is flowed by carrying out a high velocity revolution. In that case, the motor 26 of the compressor 22 is installed in the

same axle of the expansion turbine 25. And after the cold discharged from the cooling room 12 is used as an object for the heat exchange of the secondary heat exchanger 24, the compressor 22 is supplied again and heating and cooling are repeated in the same course as the following.

[0015]Therefore, this heat insulation and heat retaining device 20 by the suction fan 21, the compressor 22, and the primary heat exchanger 23. carrying out heat exchange of the open air to the air of high temperature high pressure -- warming -- with the warm air generating means which generates the pre-heating supplied to the room 11. It has a cold creating means which generates the cold which is made to carry out adiabatic expansion of the air of low-temperature high voltage with the expansion turbine 25, and is supplied to the cooling room 12, and, moreover, these warm air generating means and a cold creating means constitute the closed system which circulates air. In drawing 2 and drawing 3, the numerals 27 are the ducts piped between the secondary heat exchanger 24 and the expansion turbine 25.

[0016]Since the vending machine 10 of this embodiment is constituted as mentioned above, if it energizes and operates to the motor 26 and the suction fan 21, the compressor 22 will drive by the motor 26 and the air of a high voltage elevated temperature will flow into the primary heat exchanger 23 with this compressor 22. the pre-heating which the suction fan 21 incorporated the open air into the primary heat exchanger 23, was then generated by pre-heating by heat exchange of the open air being carried out to the air of the high temperature high pressure from the compressor 22 in the primary heat exchanger 23, and was generated -- the arrow A of drawing 2 -- like -- warming -- the room 11 is supplied. since temperature up of the open air is carried out by the primary heat exchanger 23 to about 70 ** when the air by which the incorporated open air was breathed out from the compressor 22 at ordinary temperature at this time is about 90 ** -- warming -- the goods 9, such as a can stored, can be warmed at the room 11.

[0017]On the other hand, if heat exchange of the air of the high temperature high pressure breathed out from the compressor 22 is carried out to the open air by the primary heat exchanger 23, Only the part serves as high-pressure air at low temperature, if the high-pressure air is sent into the expansion turbine 25 after being further cooled through the secondary exchanger 24, cold will be generated because the expansion turbine 25 carries out adiabatic expansion of the air, and the this generated cold will be supplied to the cooling room 12 like the arrow B of drawing 2. In this case, since it will be cooled by about -5 ** of expansion turbines by 25 if it is cooled to about 50 ** because the air from the compressor 22 passes the primary heat exchanger 23, and it falls to around 20 ** by the secondary heat exchange 24, the goods stored inside can be cooled in the cooling room 12.

[0018]By thus, the suction fan 21 of heat insulation and the heat retaining device 20, the compressor 22, and the primary heat exchanger 23. carrying out heat exchange of the open air

to the air of high temperature high pressure -- warming, since the cold which is made to carry out adiabatic expansion of the air of low-temperature high voltage with the expansion turbine 25, and is supplied to the cooling room 12 is generated while generating the pre-heating supplied to the room 11, warming -- the pre-heating supplied to the room 11 and the cold supplied to the cooling room 12 are certainly generable by one line.

[0019]Therefore, since the installing space of the machinery room 13 can be made small, it becomes unnecessary to install the heating apparatus 4 and the cooling system 5 like a conventional example, respectively -- warming -- it being lost that the storage space of the room 11 and the cooling room 12 is restricted, and expansion-ization of storage space being attained, and. Since it warms using the hot exhaust heat in one cooling system, power consumption can be reduced, and cheap-ization of a running cost can also be attained.

[0020]And since this heat insulation and heat retaining device 20 keep it warm with heat insulation by the air breathed out from the compressor 22 comprising a closed system again returned to the compressor 22, and using air as a medium, There is not only no possibility of polluting environment, but since it is not necessary to make it a high pressure like [in the case of chlorofluocarbon], it excels in safety.

[0021]Since pre-heating is generable only by heat exchange of the open air being carried out by the air and the primary heat exchanger 23 of high temperature high pressure from the compressor 22 and cold is generable by the air of high temperature high pressure being led to the expansion turbine 25, the both sides of pre-heating and cold are exactly generable. Moreover, the compressor 22 and the expansion turbine 25 are installed in the same axle, miniaturization is achieved, and since the power collected from the expansion turbine is used as a part of driving source of a compressor, expansion-izing of storage space and low-electric-power-ization are further realizable also from the point. Since the primary heat exchanger 23 and the secondary heat exchanger 24 are formed between the compressor 22 and the expansion turbine 25, heat exchange of the high-temperature-high-pressure air from the compressor 22 is carried out by 2 stage constitution and it sends into the expansion turbine 25, the heat balance of air becomes good and air cooling and heating can be performed smoothly.

[0022]Although the graphic display embodiment showed the example which applied heat insulation and the heat retaining device 20 to the vending machine 10, as it is not limited to this and shown, for example in drawing 4, it can carry in the vehicles 14 and can also use as heat insulation and an incubation vehicle. In drawing 4, identical codes are given to drawing 3 and identical parts from drawing 1. Therefore, in this invention, it is applying to what performs heat insulation and incubation simultaneously, and becomes very useful.

[0023]

[Effect of the Invention]according to the invention which relates to claim 1 as explained above -- pre-heating -- warming -- since the warm air generating means supplied to a room and the

cold creating means which supplies cold to a cooling room were constituted from one line, the effect that expansion-ization of storage space can be attained and power-saving can be attained is acquired.

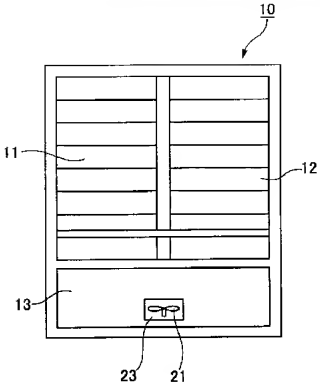
[0024]According to the invention concerning claim 2, since the open air can generate cold by being able to generate to pre-heating only by carrying out heat exchange of the air of the high temperature high pressure from a compressor by a heat exchanger, and leading the air of high temperature high pressure to an expansion turbine, the effect which can generate the both sides of pre-heating and cold exactly is acquired.

[0025]According to the invention concerning claim 3, since the power which could achieve miniaturization by installing in the same axle, and was collected by the expansion turbine is used as a part of driving source of a compressor, the effect that not only expansion-izing of storage space but power-saving is further realizable is acquired.

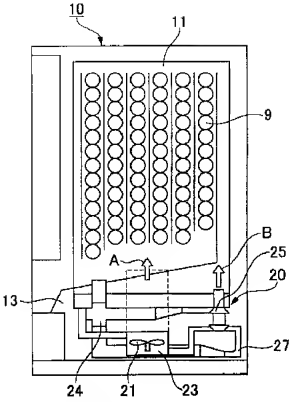
[Translation done.]

DRAWINGS

[Drawing 1]

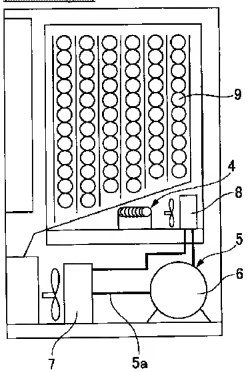


[Drawing 2]

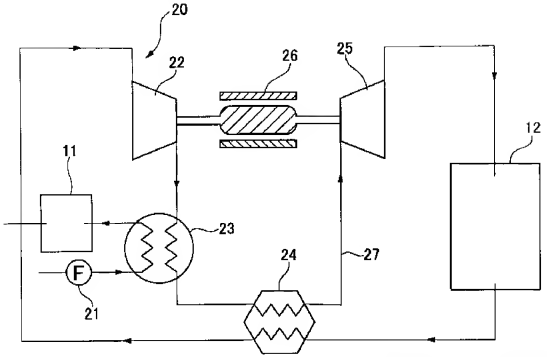


10；自動販売機　　21；吸気ファン
11；加温室　　23；一次熱交換器
12；冷却室　　24；二次熱交換器
13；機械室　　25；膨張タービン
20；保冷・保温装置

[Drawing 6]

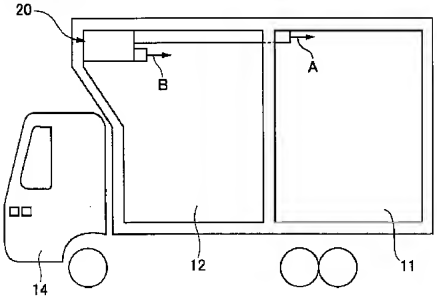


[Drawing 3]



20；保冷・保温装置　23；一次熱交換器
11；加温室　21；吸気ファン　24；二次熱交換器
12；冷却室　22；圧縮機　25；膨張タービン

[Drawing 4]



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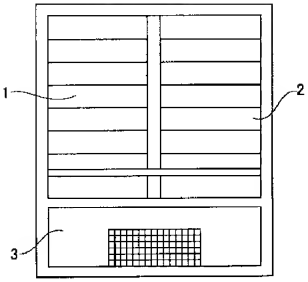
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